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CRITICISMS AND DISCUSSIONS.

THE PRINCIPLE OF PARSIMONY AND ETHICAL NEUTRALITY.

My object in writing this short note on Professor Laird's extremely interesting paper, published elsewhere in this number, is to deny that certain unpleasant consequences follow from Mr. Russell's acceptance of "Ockham's razor" as the supreme maxim of scientific philosophizing.

Professor Laird believes, for example, that Mr. Russell involves him in a falling away from the "ethical neutrality" he has claimed for his philosophy. For Mr. Russell's entities are not simpler in all respects, writes Professor Laird; and if it be claimed that they are simpler in *important* respects then a subjective standard is introduced. We must here disentangle two separate questions.

1. It may be urged in the first place that Mr. Russell abandons his "supreme maxim" as soon as he accepts a large number of entities—by which, I take it, is meant the *sensibilia* out of which "things" are constructed. Now it does not seem to me that this view could be held if it were once realized what logical atomists are trying to do. Faced by a chair, the atomist—seeking to eliminate all unjustifiable entities—resolves it into a complex of *sensibilia*. He may thereby be led to express in a very intricate manner what is simple to common sense, just as the logistician expresses $2+2=4$ in a garb highly unfamiliar to the beginner in arithmetic. But the atomist is nevertheless in this process strictly adhering to the principle of parsimony in paring away every kind of entity of which he has no direct awareness. The scientist, on the other hand, proceeds in the opposite direction: he multiplies entities unceasingly.

The chair becomes a complex of molecules, which becomes a complex of atoms, which is in turn resolved into a tangle of electrons—and so on. The ultimate goal of this multiplication of entities is the construction of a conceptual scheme which is economically “descriptive” of the increasingly complicated perceptual field opened up by experiment. Professor Laird’s argument that the sole aim of science cannot be descriptive because models are widely used, seems to me to miss the whole point about models. For, in the hands of a Maxwell, models are used precisely because they enable those concepts to be formulated between which simple relations hold—those relations having the property that the conceptual scheme so set up expresses the empirical laws in the corresponding perceptual domain. We may conclude, then, that while science is ready, for the purposes of economical description, to multiply entities philosophy seeks to limit such entities (even with loss of economy in statement) to those of which we are directly aware. In other words, the scientific principle of economy is anthropomorphic; the principle of parsimony is not.

2. It may now be urged, however, that though Mr. Russell’s entities are simpler than those of science, as being all of one type, yet our choice of this system is egocentric. This seems to be what is at the back of Professor Laird’s contention. In this he is adopting a similar attitude to that of Dr. Schiller who urges that the principle of parsimony is a maxim of practical convenience. “To a non-human mind,” he says, “that was not pressed for time but disposed of all eternity it would be unmeaning or repugnant.”¹ This argument depends for its plausibility on the different forms in which the “razor” is expressed. If, however, we express it as *Pluralitas non est ponenda sine necessitate*, then we merely assert that you must not suppose that more things exist than you have evidence for. The criterion is the appeal to the external world. The standard is therefore not subjective, unless it is assumed that everything, including sense-data, is subjective. Furthermore, from what has been said above it is clear that this is *not* a maxim of “practical convenience.” It is, in fact, usually convenient to contravene it. If, for example, we always used Mr. Russell’s constructions instead of “things,” our novels could only be read by those who disposed of all eternity. And if we avoided the use of the entity “number,” Jones minor’s text-book of arithmetic would be

¹ *Mind*, N. S., Vol. XXIV, p. 402.

weightier than Jones minor. In other words, in practical affairs we emphatically do not (and never shall) use the razor to cut away our tables and chairs and numbers and electrons. Ockham's razor is on the contrary an impractical maxim only applied in those moments of critical analysis when we desire to know what errors we are daily committing from pragmatic motives.

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THE LOGICAL SIGNIFICANCE OF "OCKHAM'S RAZOR."

In adopting the principle of parsimony or "Ockham's razor" as the supreme maxim of methodology, Mr. Russell seems to have been guided by esthetic motives. To some of us, indeed, it seems to be more beautiful to start the development of a science in deductive form from three fundamental or "primitive" ideas instead of from four and to define all the rest in terms of these three, and even more beautiful to start from two primitive ideas. But there seems to be a *logical* basis for this preference, for the reduction in the number of primitive ideas implies a discovery of dependence between those ideas at first taken to be indefinable. I shall try to make this more precise.

Formally, the ideas of a deductive science, both the primitive ones and the ones that are defined in terms of them, may be regarded as the "unknowns" in an algebraic problem, between which equations, representing the definitions, subsist. This is at the basis of the algebra of logic. If the number of independent equations is equal to that of the unknowns, the unknowns can be wholly defined. This is the case with the science of arithmetic, according to modern ideas; for number and the other ideas with which arithmetic is concerned are all definable in terms of logic. But if the number of independent equations is less than that of the unknowns, some of the unknowns are indefinable, and in fact it may be more convenient to leave more of the unknowns undefined than are strictly necessary, and preserve the equations between these indefinables. In algebra we may find that, with the unknowns x , y , z , we know that $x=f(z)$ and $z=\phi(y)$, and consequently that y is strictly speaking the only indefinable; but it may be symbolically impossible